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Spectrophotometric method for simultaneous estimation of ornidazole and curcumin in pure form

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ABSTRACT

The present study is very optimistic towards the development in dosage forms loaded with synthetic and herbal drug combination. The simultaneous estimation was done by using Spectrophotometric method, using ethanol as solvent. Stock solutions of ornidazole and curcumin were diluted to a final concentration of 10 µg/ml. UV scans of 10 µg/ml solution of both drugs combinations showed the absorption maxima at 319 nm and 430 nm respectively by using ethanol as blank. The colored complex obeyed Beer's law in the concentration range of 1 to 10 µg/ml. The above method was a rapid tool for routine analysis of ornidazole and curcumin in the bulk. The recovery studies confirmed the accuracy and precision of the method.

Keywords: Visible spectrophotometry, curcumin, ornidazole.

1. Introduction

Ornidazole, chemically, 1-chloro-3-(2-methyl-5-nitro-1H-imidazol-1-yl)propan-2-ol and other protozoa 1 diseases. Whereas curcumin is a bis- α , β - unsaturated β -diketone with molecular weight 368.37 used in the treatment of inflammation. On ultraviolet-visible spectrophotometric investigation maximum light absorption of both drugs occurs at 319 nm and 430 nm respectively.

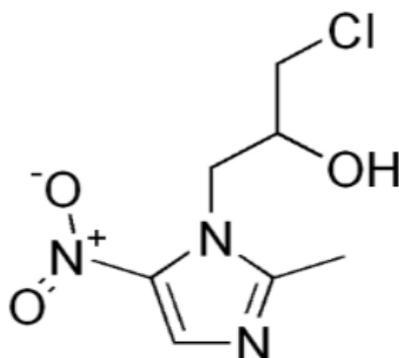


Fig 1: Ornidazole

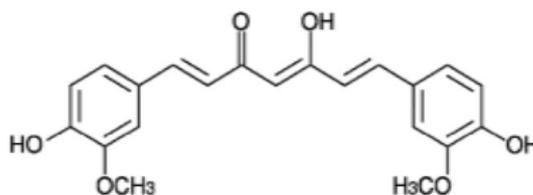


Fig 2: Curcumin

2. Materials and Methods

2.1 Materials: UV-visible double beam spectrophotometer, Shimadzu Model 1800 with matched quartz cells was used for all spectral measurements. Ornidazole was obtained as a gift sample from micro Lab Limited, Chennai, India, curcumin was a gift sample obtained from RYM Exporters, New Delhi.

2.2 Experimental Methods

2.2.1 Selection of common solvent: After the solubility study of both drugs in different solvents, ethanol was confirmed as a common solvent for developing spectral characteristic.

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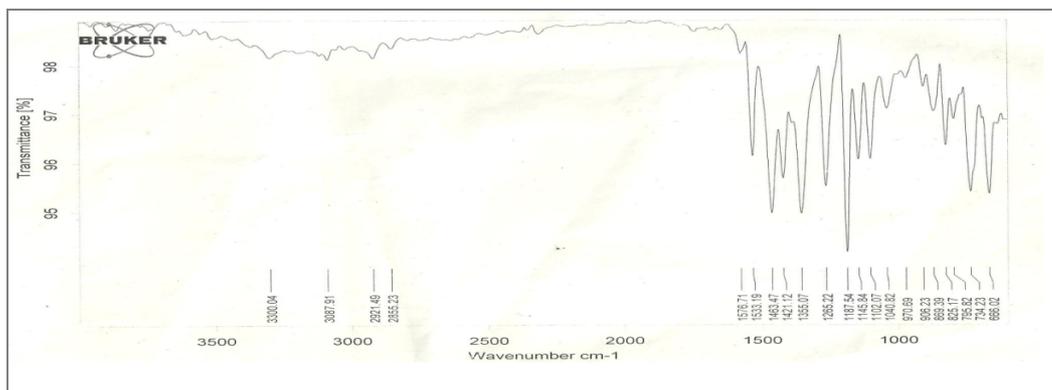


Fig 3: FTIR for ornidazole

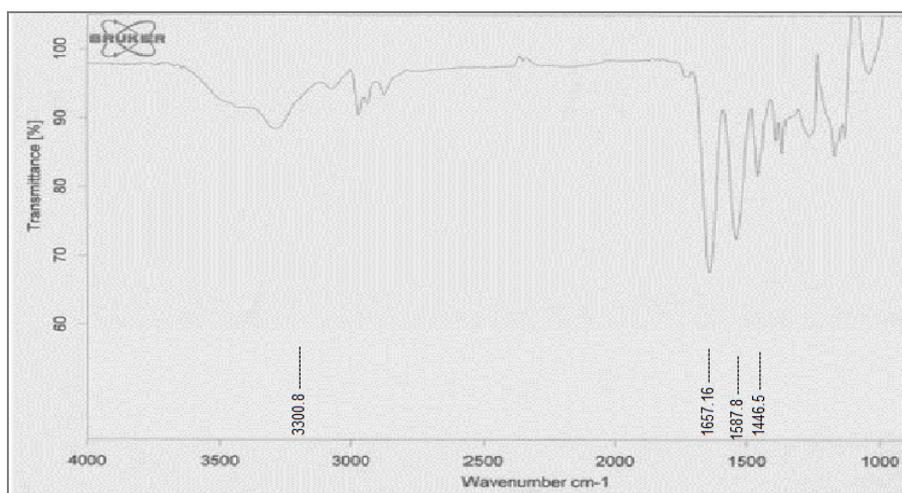


Fig 4: FTIR for curcumin

2.2.2 Preparation of standard stock solution: Ornidazole (100 mg) was transferred to a volumetric flask (100 ml) having a reasonable quantity of ethanol and mixed properly. The volume was made up to 100 ml with ethanol to have concentration of 1000 µg/ml. 10 ml of above solution was diluted to 1000 ml to give concentration of 10 µg/ml. The same was designated as stock solution and was reserved for preparation of aliquots of various concentration. 1, 2, 3, 4, 5, 6, 7, 8, 9 ml aliquots of stock solution was taken in a volumetric flask (10 ml) and volume was made up to 10 ml with ethanol to have concentration of 1, 2, 3, 4, 5, 6, 7, 8, 9 µg/ml. The absorbance was recorded for these concentration at 319 nm by using ethanol as a blank. The same was done for curcumin.

2.2.3 Drug: drug interference study: Standard stock solution (10 µg/ml) of ornidazole and curcumin was prepared separately in ethanol by serial dilution technique. The absorbance values for ornidazole and curcumin were recorded at 319 nm and 430 nm respectively, using ethanol as a blank. Absorptivity values **A (1%, 1 cm) were calculated for both wavelengths from absorbance values.**

2.3 Method 1

2.3.1 Simultaneous Equation Method: From the standard

stock solutions, 10 ml of both the solutions were taken and made it to final concentration of 10 µg/ml. Absorbance was measured at both the wavelengths (319 nm and 430 nm) by using ethanol as blank. The reading were taken in triplicate. Absorbances of both the drugs were recorded at both the wavelengths. The concentration was determined by using simultaneous equation method:

$$A_1 = ax_1C_p + ay_1C_s \dots\dots\dots \text{(At 319 nm)}$$

$$A_2 = ax_2C_p + ay_2C_s \dots\dots\dots \text{(At 430 nm)}$$

A_1 = absorbance value of the sample solution at 319 nm

A_2 = absorbance value of the sample solution at 430 nm

ax_1 = absorptivity of ornidazole at 319 nm

ax_2 = absorptivity of ornidazole at 430 nm

ay_1 = absorptivity of curcumin at 319 nm

ay_2 = absorptivity of curcumin at 430 nm

C_p = concentration of the curcumin in µg/ml

C_s = concentration of the ornidazole in µg/ml

Table: Linearity data

Parameters	Value for ornidazole	Value for curcumin
λ_{\max}	319 nm	430 nm
Linearity range($\mu\text{g/ml}$)	1-10	1-10
Absorptivity	.029	.030
Regression coefficient(r^2)	0.999	0.999

Estimation of Absorptivity (E 1%, 1cm) values at Selected Wavelengths:

The Absorptivity (E 1%, 1cm value) of Ornidazole and curcumin drugs was calculated at 319 nm and 430 nm.

2.4 Method 2

2.4.1 Q- Analysis (Absorbance Ratio Method): Q-Absorbance method depends on the property that, for a substance which obeys Beer's law at all wavelength, the ratio of absorbances at any two wavelengths is a constant value independent of concentration or path length. In the quantitative assay of two components in a mixture by the absorbance ratio method, absorbances are measured at two wavelengths: One being the λ_{\max} of one of the component (λ_2) and the other being a wavelength of equal absorptivities of the two components i.e. an iso-absorptive point.

2.4.2 Determination of Iso-absorptive point and selection of suitable Wavelength: An iso-absorptive point (a wavelength of equal absorptivity of the two components) was determined by taking overlain spectrum of the solutions Ornidazole and

curcumin (20 $\mu\text{g/ml}$ each) in ethan ol (95%) in UV range against the solvent blank. From the overlain spectra of the two drugs, it was found that ornidazole showed λ_{\max} at 319 nm and curcumin showed λ_{\max} at 430 nm. Iso-absorptive point was found out at 351 nm, as iso-absorptive point was selected for estimation of Drug simultaneously.

3. Study of Beer's Lambert Law

The solutions having concentrations in range 1-10 for both ornidazole and curcumin were prepared in 0.1 N HCl using working standard solution. The absorbances of resulting solutions were measured at 272 nm and 292 nm. Calibration curves were plotted at these wavelengths. Both the drugs obeyed linearity individually and combination within the concentration range of 1-10 $\mu\text{g/ml}$ for both ornidazole and curcumin.

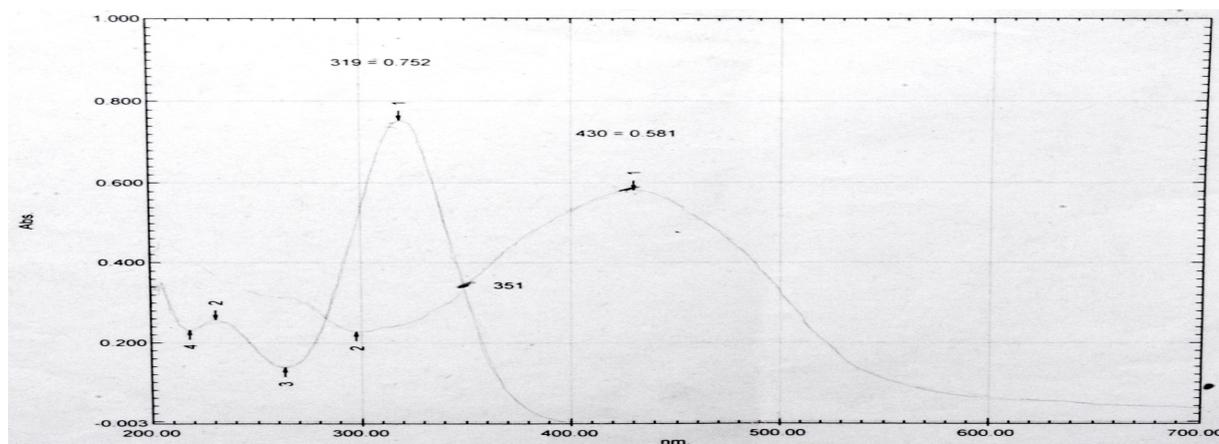


Fig 5: Overlay spectra of ornidazole and curcumin with iso absorptive point

4. Results and Discussion

The individual concentration range for beer-lambert was found 1-10 $\mu\text{g/ml}$ for both ornidazole and curcumin at 319 nm and 430 nm with coefficient correlation. 0999 and 0.999 respectively shown in table 1. UV scan of 10 $\mu\text{g/ml}$ solution of ornidazole and curcumin combination showed the absorption maxima at 319 nm and 430 nm. The simultaneous estimation was done to check the interference between both the drugs at the at λ_{\max} of one another. By substituting absorbance and absorptivity values of table in simultaneous equation, C_1 and C_2 were calculated, $C_1=9.78 \mu\text{g/ml}$,

$$C_2=10 \mu\text{g/ml}$$

The percentage of ornidazole and curcumin recovered after the

combination was found to be 97.8% and 100% respectively indicating no interference between both the drugs. The Linearity was observed by the linear regression equation method for curcumin and ornidazole in different concentration range. The correlation coefficient of these drugs was found to be close to 1.00, indicating good linearity. Hence proposed method can be used for routine analysis of these two drugs in combined dosage form. It is validated as per ICH guidelines.

5. Conclusion

The proposed UV spectrophotometric method was found very simple, rapid and economical. However, the most important outcome of the simultaneous estimation is that we can formulate and analyse both the drugs in combination for any

suitable dosage form in a very safe and effective way

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